Inherently Safer Concepts: The American Chemistry Council Position

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Begin With the End in Mind

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- ACC and its member companies believe that Inherently Safer (IS) Concepts are one of a number of valuable risk reduction tools within an overall risk management framework.
- However ,IS is not the only tool, and should not be applied to the exclusion of all others.

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Traditional IS Concepts

- The traditional approach to IS was defined by Trevor Kletz nearly 40 years ago, defining four main categories for implementation of IS:
  - Substitute
  - Minimize
  - Moderate
  - Simplify

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Traditional IS Concepts

- While this framework provides a useful grounding in the fundamental concepts of IS, over time it has significantly limited IS application, due to the “either-or” nature of the alternatives.

Traditional IS Concepts

- By definition, IS concepts are consequence-based; that is, IS techniques apply only to the magnitude of the outcome of an event, not to its probability of occurrence.

Traditional IS Concepts

- Thus, using IS as an exclusive decision-making criterion precludes the use of some of the best risk reduction methodologies available to industry and government.

Risk-Based Decision Making

- A true risk-based approach must include consideration of both parts of the risk equation to arrive at an appropriate conclusion.

Risk-Based Decision Making

- Therefore, ACC believes that IS, as a consequence-only technique, can only be properly used in a holistic risk management framework.
- An important aspect of this approach is that it allows evaluation of whether an IS method actually reduces risk or merely shifts risk from one potentially exposed population to another.

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Risk-Based Decision Making

- Each facility is unique in the chemicals it stores, produces, and handles.
- Risk-based evaluation of a chemical process for a proposed change involves evaluating the modification for its potential effect on the integrity of the chemical product or process as well as for its own set of potential risks to the public or the environment.

Risk-Based Decision Making

- Evaluation of one or more of these factors may indicate that the modification would not significantly reduce risk, may shift significant risk elsewhere and/or be technologically or economically infeasible.
- Even substitution of one chemical for another that may be considered a safer alternative, once thoroughly analyzed in its application context, may not adequately address risk or be feasible.

Safety and Security Issues—At Odds?

- IS was developed as a safety tool. Applying it to a security issue may lead to making an individual facility more “safe” while making society as a whole less “secure” through risk-shifting.
- Example—forcing sites to minimize chlorine inventory will put more railcars out on the open tracks, instead of inside a secured perimeter.

Safety and Security Issues—At Odds?

- Application of IS concepts outside of a holistic risk framework may also increase environmental impact in the name of “safety”
- Example—Substitution of a less acutely toxic raw material may lead to lower reaction efficiency, increased waste generation, and increased energy usage.

Risk-Based Decision Making

- More importantly, under a risk-based framework, a facility that finds IST alternatives to be infeasible has the flexibility to apply other measures, or “layers of protection” to the process that would not be considered under a consequence-only based IS evaluation.

Risk-Based Decision Making

- Oversimplification of the IS evaluation process in a streamlined regulatory approach will be prescriptive, rather than provide the flexibility necessary to properly evaluate all risks, which could:
  - Drive DHS to inadvertently and inappropriately affect commerce
  - Divert scarce resources from the original intent of CFATS—namely, effective implementation of chemical plant security measures.

An Example

- A chlorine user is mandated to switch from the use of one ton (2200 lb) cylinders to 160 lb cylinders, thus reducing the overall ERPG-3 dispersion footprint from 0.5 miles to 200 feet under the most common atmospheric conditions. It is believed that this mandated change will improve overall health and safety.

An Example

- In reality, the “improvement” to safety may be illusory, as:

1. There may be no permanent population between 200 feet and 0.5 miles (remote location), so the size of the ERPG-3 plume is irrelevant.

An Example

2. The number of cylinder changeovers has now increased by a factor of 13. Since the most likely time for a cylinder to leak is when the connections are changing, and since the occupancy at changeover is 100% (there will ***always*** be someone present at the cylinder when it is swapped out), the actual risk to the operator has now increased by more than an order of magnitude.

Another Example

- A chemical facility is prohibited from using a pneumatic (nitrogen at pressure) test for a 6500 foot in-plant pipeline, being mandated to use the “safer” hydrostatic testing method (water).

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Another Example

- In most cases, the hydrostatic test method is strongly preferred since it is, in effect, not building a pressurized “bomb”.
- However, the pipeline in question will be handling a strongly water-reactive chemical (a fact unique to this application).

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Another Example

- Should any residual water be left in the pipeline, when chemicals are introduced, a potentially catastrophic chemical reaction with resulting gas generation and potential pipeline burst has a much higher probability of occurrence.

Conclusion
(The End We Had in Mind)

- **ACC and its member companies believe that Inherently Safer (IS) Concepts are one of a number of valuable risk reduction tools within an overall risk management framework.**
- **However, IS is not the only tool, and should not be applied to the exclusion of all others.**

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Conclusion
(The End We Had in Mind)

- **ACC strongly supports implementation of CFATS as currently configured.**
  - **CFATS has already demonstrated its effectiveness—witness more than 2000 facilities that have dropped out of the program through implementation of various measures.**

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Questions?

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